Safety light curtain

Order code LIGI - safety light curtain

LIGI-01-P01-T00-A-44-2555-F00-C00-S000

Description

Housing design
01 = standard profile
16x16mm
02 = H profile
29x14mm
11 = separated electronics

Output versions
OSE = rectangular signal
P01 = PNP/positive switching, light-on switching (preferred configuration)
P02 = PNP/positive switching, dark-on switching
N01 = NPN/negative switching, light-on switching (preferred configuration)
N02 = NPN/negative switching, dark-on switching

Testing
T00 = without, only activates the alignment mode
T01 = pull-down resistor, test=low or open
T02 = pull-down resistor, test=high
T03 = pull-up resistor, test=low
T04 = pull-up resistor, test=high or open

Beam geometry
A = up to 540mm height → 50mm detection capability
from 540mm height → 70mm detection capability
B = up to 540mm height → 50mm detection capability
from 540mm up to 995mm height → 70mm detection capability
from 995mm height → 200mm detection capability
C = up to 540mm height → 50mm detection capability
from 540mm height → 200mm detection capability

Active light beams 08...44

Active detection zone
in mm (light curtain is longer)

F = function
00 = with door function (blanking)
01 = without door function (blanking)

C = cable length/connector
00 = standard version
pig-tail connector with M8 plug, 4-pin

S = special version
000 = standard version
XXX = custom design without
functional difference,
for example: color, logo, etc.

Key to symbols

Recommendation for optimal procedure.

Risk of death in the case of non-observance.

Safety instructions

- The safety instructions in the operating manual must be observed.
- Installation and electrical connection may only be carried out by trained personnel.
- The safety light curtain complies with the requirements of Category 2 and PL=d as per EN 13849-1 and must be integrated into the operating procedure in a fault-free manner in accordance with the applicable regulations and standards in order to achieve proper protective functioning.
- In accordance with EN 12978, the safety light curtain is suitable for all door types apart from sluice and dock gates, lift doors, vehicle doors, gates used mainly in animal husbandry, textile theatre curtains, railway level-crossing barriers, barriers that are used solely for vehicle traffic, and dangerous machines that are not doors.
- During mounting, installation and commissioning, it must be ensured that the photo switch system cannot be influenced by other photo switch systems or sources of infrared light.
- The applicable standards and regulations – particularly EN 12453 (Safety in use of power operated doors) – are to be observed during mounting, installation, commissioning, maintenance and repair.
- Strictly observe the regulations of the EN12978 when connecting safety devices on power operated doors.
- The manufacturer assumes no liability for damage caused by operation and connection errors, non-observance of the operating manual or lack of maintenance or care; the manufacturer wishes to draw attention again to the possible hazardous situations that can arise in this way.
- Notwithstanding conformity with harmonised standards, it is not possible to foresee every potential risk. For this reason, persons should only be present in the hazardous area when necessary.

Purpose

The safety light curtain (LIGI) consists of a transmitter and receiver and is suitable for all automatic door types with a minimum door width of 1.6m. The LIGI complies with the following regulations: EN 12978, EN 12445 and EN 12453. The closing speed of the door is to be selected in such a way that the force limit values as per EN 12453 are adhered to. Only objects that are 5mm larger than the beam separation distance can be detected.

Mounting, installation and commissioning

Mounting, installation and commissioning of safety light curtains may only be carried out by trained personnel in accordance with the specifications of the door manufacturer. The specifications in this operating manual are also to be adhered to. Operation under conditions other than those intended and modifications to the optics and casing are not permitted and result in loss of EC conformity.

When installing PNP/NPN versions, it must be ensured that the door control system checks the safety light curtain versions with a test input once per door cycle. To do so, the control system must trigger the test input on the transmitter for at least 100ms and monitor the reaction behaviour of the output of the receiver. If the time behaviour corresponds to the technical data, the test is successful. Testing by briefly switching off the supply voltage is not suitable.

In addition, it must be ensured that the polarity of the supply voltage to the transmitter is in accordance with this manual, depending on the distance between the transmitter and receiver. This setting must also be checked on the transmitter side by means of the green and yellow LEDs. This measure ensures that the transmitter operates with an increased transmission pulse current only for ranges greater than 4m.

The safety light curtains are designed in such a way that sunlight and light from halogen lamps and fluorescent tubes (see IEC 61496-2) do not lead to undesired activation.

In rare cases, other photo switches or sources of infrared light can lead to undesired activation. These sources of light interference must be dealt with in such cases by switching off, blocking or removing them.

Mounting, installation and commissioning

If two light curtains (in front of and behind the door) are to be used to provide protection, the separation distance between the light curtain and door should be small enough that persons cannot be present undetected between the door and the detection zones that are created. For this application, the two transmitter of the light curtains should be mounted on opposite sides of the door.

Only one light curtain can be mounted in the door opening. In this case, the “door function” of the light curtain prevents detection by the door itself.

When the light curtain is being mounted, it is to be placed on a stable subsurface. Ensure that the ground is sufficiently level so that the sensor function can work at all points.

The first fixing clamp should be around 10cm above the ground and the last clamp should be 10cm from the end; between these points, fixing clamps should be used to fasten the profile at maximum intervals of 60cm. Optical components (transmitters, receivers, LEDs) must not be covered.

A risk assessment in accordance with the machinery directive is the basis for deciding on the selected safety method.

The alignment of the light curtain should be optimised after it has been mounted. If the test input of the light curtain is activated for longer than 15s, the light curtain switches into alignment mode. The signal reserve can be optimised in alignment mode by alternately rotating the LIGI transmitter and LIGI receiver.

If the signal reserve is less than 2, the green receiver LED flashes in this mode. The green LED remains on for signal reserves greater than 2 and the red receiver LED flashes with increasing flash frequency when the signal reserve increases. The signal reserve should be a factor of 2 or greater to ensure fault-free operation as well as to tolerate a certain amount of dirt.

As soon as the test input is deactivated for a short period, the light curtain returns to normal mode.

Electrical connection:

The connections are made depending on the version according to the supplied circuit diagram.

Important note: The sync cable (white wire, or yellow wire for OSE) is an internal connection between the transmitter and receiver which must not be connected in the controller!

Adaptation to door width:

The LIGI transmitter can be adjusted for door widths of 1.6 to 4m and 4 to 10m by reversing the polarity of the operating voltage.

Alignment mode:

This mode allows for optimum alignment of the LIGI based on a variable flash frequency of the LEDs on the receiver.

Error messages:

The LIGI has an internal error diagnosis function which indicates errors by means of an LED code depending on the type of error. In the event of an error, the LIGI switches to safe mode and the door can then only be operated in "dead man" mode.

Operating mode

Legend

- LED lit
- LED flashing
- LED off

Transmitter	
Preset door width 1.6 to 4m	
Preset door width 4 to 10m	
Test (LEDs flashing alternately)	

Receiver	
Free detection zone	
Interrupted detection zone	
Test (LEDs flashing alternately)	

Alignment mode

Legend

- LED lit
- LED flashing
- LED off

Transmitter	
Alignment mode (LEDs flashing alternately)	

Receiver		
Signal reserve less than 2x		Green LED flashing
Signal reserve greater than 2x		Flash frequency of red LED increases with signal reserve

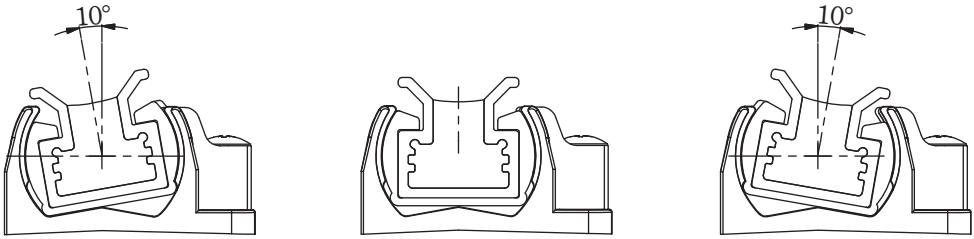
Alignment mode is accessed by activating test or alignment mode for at least 15s and for the duration of alignment. (See pages 12 and 17.)

Rotating the transmitter and receiver increases or reduces the reception level. The more the level increases, the faster the flash frequency of the red LED will be.

When the maximum flash frequency is reached, the light curtain is optimally aligned and can be fastened in place.

For PNP or NPN output versions, the test input must now be disconnected from the fixed potential again and connected to the test input of the controller.

The test input is only required for alignment when using the OSE output versions. Connect to 0V in normal operation.



Error mode

Legend

- LED lit
- LED flashing
- LED off

	Transmitter	Error mode	Receiver	
No supply voltage	⊗ ⊗		⊗ ⊗	Check supply voltage
Receiver polarity reversed	● ⊗		⊗ ⊗	Check receiver operating voltage
Short at output		Red LED flashes 2x, long pause	⊗ ⊗ ⊗ ⊗ ★ ★ ⊗ ⊗	Check output cable, overload, wrongly connected, cable defective, output on light curtain defective
Error in sync cable	● ● ● ● ★ ★ ★ ⊗	Yellow LED flashes 3x, long pause		Check white cable, may only be connected between transmitter and receiver
Internal device error	● ⊗ ● ⊗ ★ ⊗ ★ ⊗	All LEDs flashing	● ⊗ ● ⊗ ★ ⊗ ★ ⊗	Light curtain must be replaced

Testing

The operation of the light curtain is to be tested as follows once it has been mounted.

1. A test rod with a diameter of 50mm must be continuously detected over a range of 0mm to 500mm above the ground.
2. A test object with an edge length of 200mm must be continuously detected over a range of 0mm to 2500mm above the ground. The test bodies should be moved from bottom to top during these tests.

Top view:
Door and recommended light curtain layout of T=transmitter and R=receiver

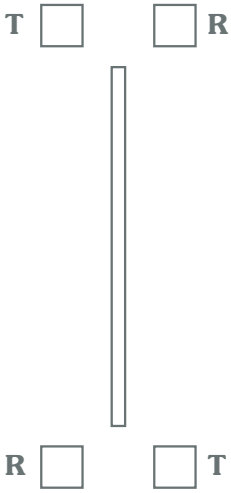


Figure 1
Without door function
(Blanking function)

Figure 2
With door function
(Blanking function)

Maintenance and repair

The safety light curtain does not have any wearing parts that need to be maintained.

The light entry and exit openings are to be cleaned regularly, depending on the dirt that occurs. Use a cloth with soapy water or a water jet for this purpose. High-pressure cleaners, abrasives and organic solvents must not be used.

Check regularly whether the light curtains are correctly aligned. Adjust the alignment if necessary. The light curtain casing, the optics areas, the plug and the connection cable are to be checked regularly for damage. Parts with significant damage must be replaced.

If light curtains are replaced, they must only be replaced by identical light curtains or by other safety light curtains that are intended for the relevant door by the door manufacturer.

Transmitter and receiver light curtains must only be replaced in pairs so as to ensure that the same software and hardware status is present.

Repairs must only be carried out by trained personnel.

Versions

Number of channels:	From 8 to 44 channels
Connection:	
Connection cables	5m and 15m, the total length must not exceed 25m
Connection plug	Pig-tail connector with M8 plug, 4-pin, L=130mm
Door function:	Continuous interruption starting at the top light beam and going towards lower light beams does not lead to detection as this is interpreted as lowering of the door. After stopping for more than 1.5s interruption will be shown. Only after complete opening of the door an uninterrupted detection zone will be signalled at the output. After that automatic closing is possible.

Technical data

Safety parameters	ESPE type 2 as per IEC 61496-2 $MTTF_D$ > 100 years; DC_{AVG} > 99% Category 2; PL d (PFH=$7.33 \cdot 10^{-9}$ 1/h) as per EN 61508-2; Category 2 for LIGI-xx-Nxx and LIGI-xx-Pxx with only one suitable external control system for testing
Door widths	1.6 to 10m
Rated voltage	24V DC -58% +25% (10 to 30V DC)
Current consumption	Transmitter: Approx. 30mA (24V DC) Receiver: Approx. 20mA (24V DC)
Power consumption	Approx. 1.2W
Detection zone height	Max. 2555mm
Channel count	Max. 44
Type of light	Modulated infrared
Type of switching:	Light switching, i.e. the following applies for free detection zones: OSE output = Alternating signal (approx. 950Hz) PNP output = High level NPN output = Low level
Aperture angle	Max. ±5° as per IEC 61496-2
Detection capability	0 to 500mm, detection object ≥ 50mm 500 to 2560mm, detection object ≥ beam separation distance + 5mm
Door function	Door speed ≤ 1.3m/s
OSE output	Approx. 950Hz, alternating signal, 4V 20mA, short proof, reverse polarity protection, max. 100nF, max. 30µA leakage current, integrated pull-down 220Ω
PNP output	100mA, short proof, reverse polarity protection, max. 220nF, max. 350µA leakage current, integrated pull-down 10kΩ
NPN output	100mA, short proof, reverse polarity protection, max. 220nF, max. 150µA leakage current, integrated pull-up 10kΩ

Technical data

Ambient light safety	≥100klux
Housing material	Aluminium profile, fully filled, with 2K epoxy resin
Connection	Pig-tail M8 plug 4-pin, L=130mm
Degree of protection	IP67 as per EN 60529
Operating temperature	-20 to +60°C
Storage temperature	-30 to +70°C
Air humidity	Max. 95%
Weight	Approx. 1860g
Dimensions	2800x16x16mm (LxWxH)

Test input

Version	Normal operation	Test/alignment	Internal input wiring
T00	<2V	>7V	10kΩ pull-down resistor to 0V
T01	>7V	<2V	10kΩ pull-down resistor to 0V
T02	<2V	>7V	10kΩ pull-down resistor to 0V
T03	>7V	<2V	10kΩ pull-up resistor to 24V
T04	<2V	>7V	10kΩ pull-up resistor to 24V

Testing

Reaction of the output after activation of the test input for a free detection zone

Variant	Reaction of the output
PNP / ≤21 channels	after max. 50ms switch from high to low level
PNP / ≥22 channels	after max. 100ms switch from high to low level
NPN / ≤ 21 channels	after max. 50ms switch from low to high level
NPN / ≥ 22 channels	after max. 100ms switch from low to high level
OSE	This version is not tested.

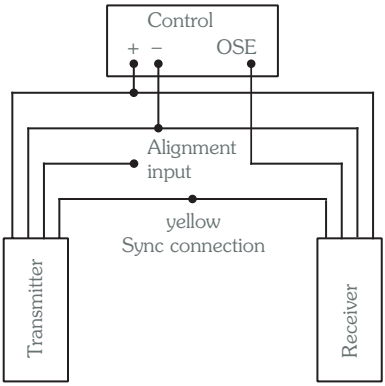
Technical data

Reaction of the output after deactivation of the test input for a free detection zone

Version	Reaction of the output
PNP / ≤21 channels	after max. 50ms switch from low to high level
PNP / ≥22 channels	after max. 100ms switch from low to high level
NPN / ≤ 21 channels	after max. 50ms switch from high to low level
NPN / ≥ 22 channels	after max. 100ms switch from high to low level
OSE	This version is not tested.

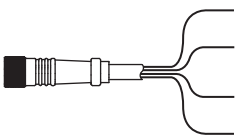
Number of channels	Switching time	Definition
≤ 21 channels	t (on) ≤ 50ms	Interruption of light beam
	t (off) ≤ 400ms	Detection zone becoming free
≥ 22 channels	t (on) ≤ 100ms	Interruption of light beam
	t (off) ≤ 800ms	Detection zone becoming free

Connection scheme, OSE output



Transmitter bar

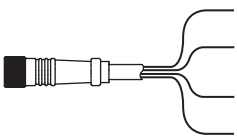
Pig-tail connector



1 brown — 10 to 30V DC and range setting
3 white
2 yellow - Sync connection → Receiver
4 green - Alignment input

Receiver bar

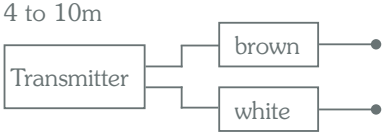
Pig-tail connector



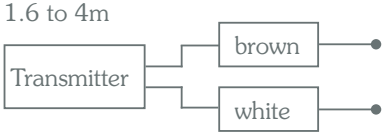
1 brown - ⊕ 10 to 30VDC
3 white - ⊖ GND
2 yellow - Sync connection → Transmitter
4 green - OSE output 950Hz

Range setting

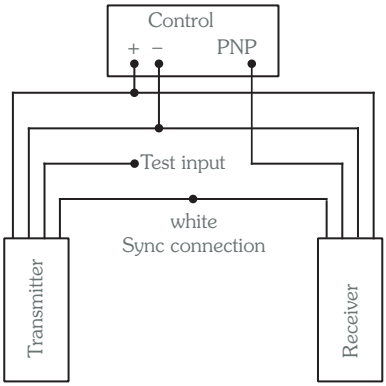
4 to 10m



1.6 to 4m

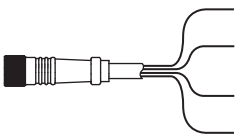


Connection scheme, PNP output



Transmitter bar

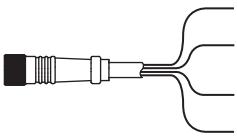
Pig-tail connector



1 brown
3 blue
} 10 to 30V DC and range setting
2 white - Sync connection → Receiver
4 black - Test input

Receiver bar

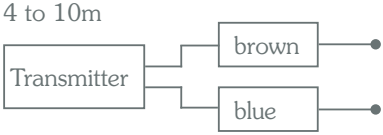
Pig-tail connector



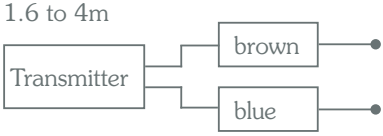
1 brown - ⊕ 10 to 30VDC
3 blue - ⊖ GND
2 white - Sync connection → Transmitter
4 black - PNP output

Range setting

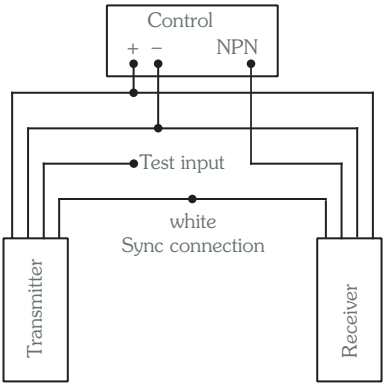
4 to 10m



1.6 to 4m

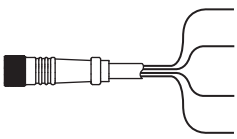


Connection scheme, NPN output



Transmitter bar

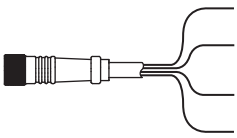
Pig-tail connector



1 brown] 10 to 30V DC and
3 blue] range setting
2 white - Sync connection → Receiver
4 black - Test input

Receiver bar

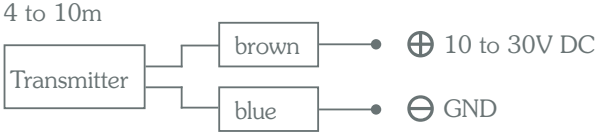
Pig-tail connector



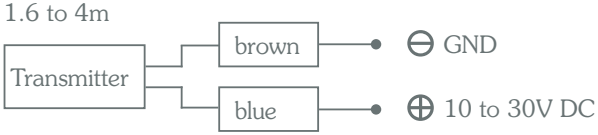
1 brown - ⊕ 10 to 30VDC
3 blue - ⊖ GND
2 white - Sync connection → Transmitter
4 black - NPN output

Range setting

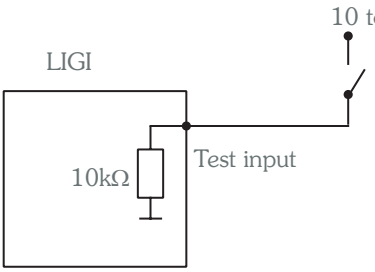
4 to 10m



1.6 to 4m

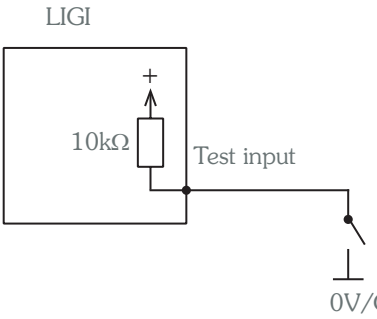


Connection scheme, test inputs T00, T01 and T02



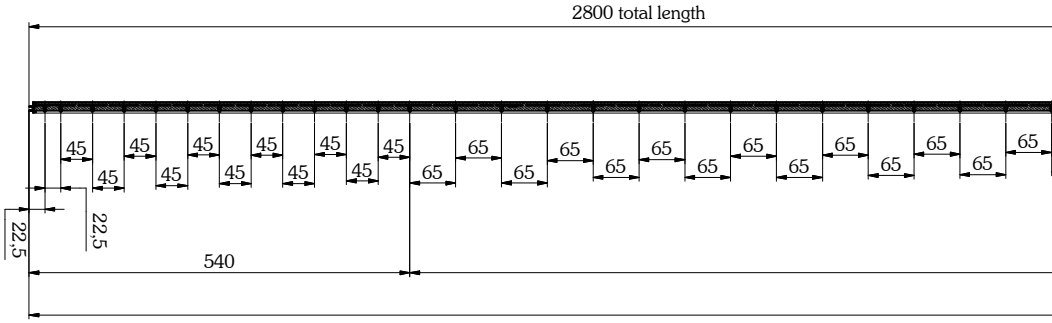
T00 → Adjustment=High level or switch closed
T01 → Test=Low level or switch open
T02 → Test=High level or switch closed

Connection scheme, test inputs T03 and T04

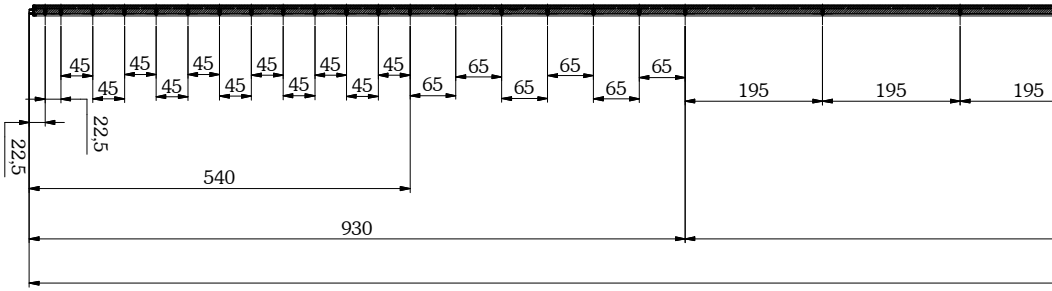


T03 → Test=Low level or switch closed
T04 → Test=High level or switch open

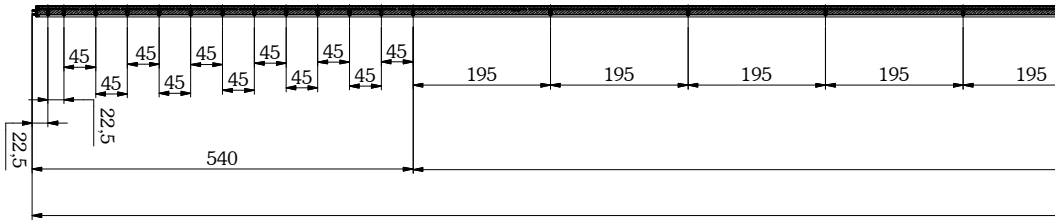
Channel selection



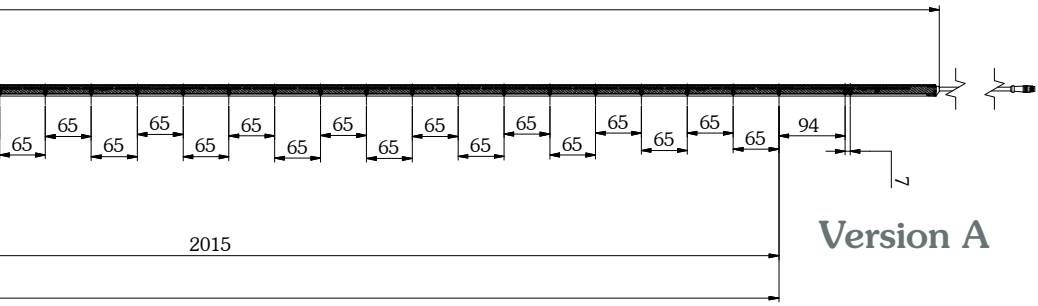
2555mm active detection zone, 44 channels



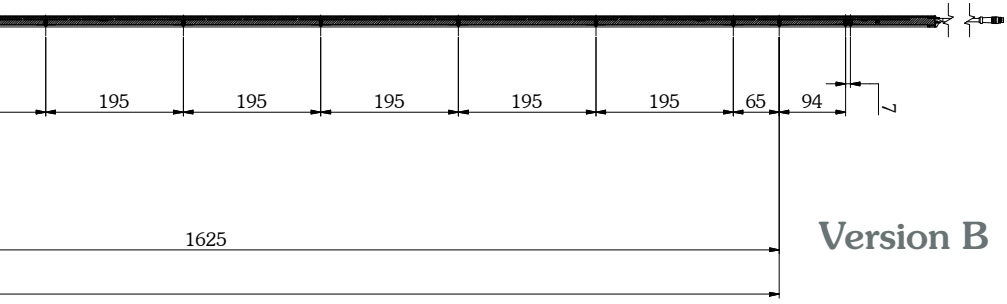
2555mm active detection zone, 28 channels



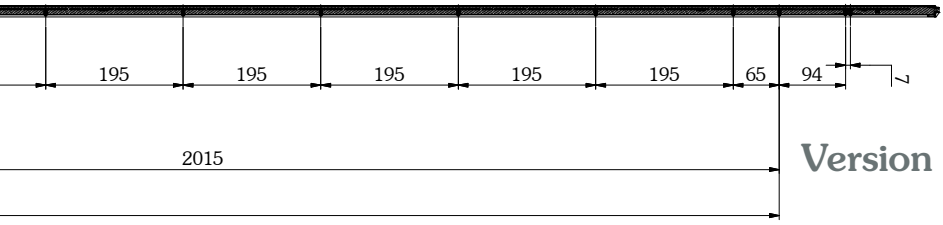
2555mm active detection zone, 24 channels



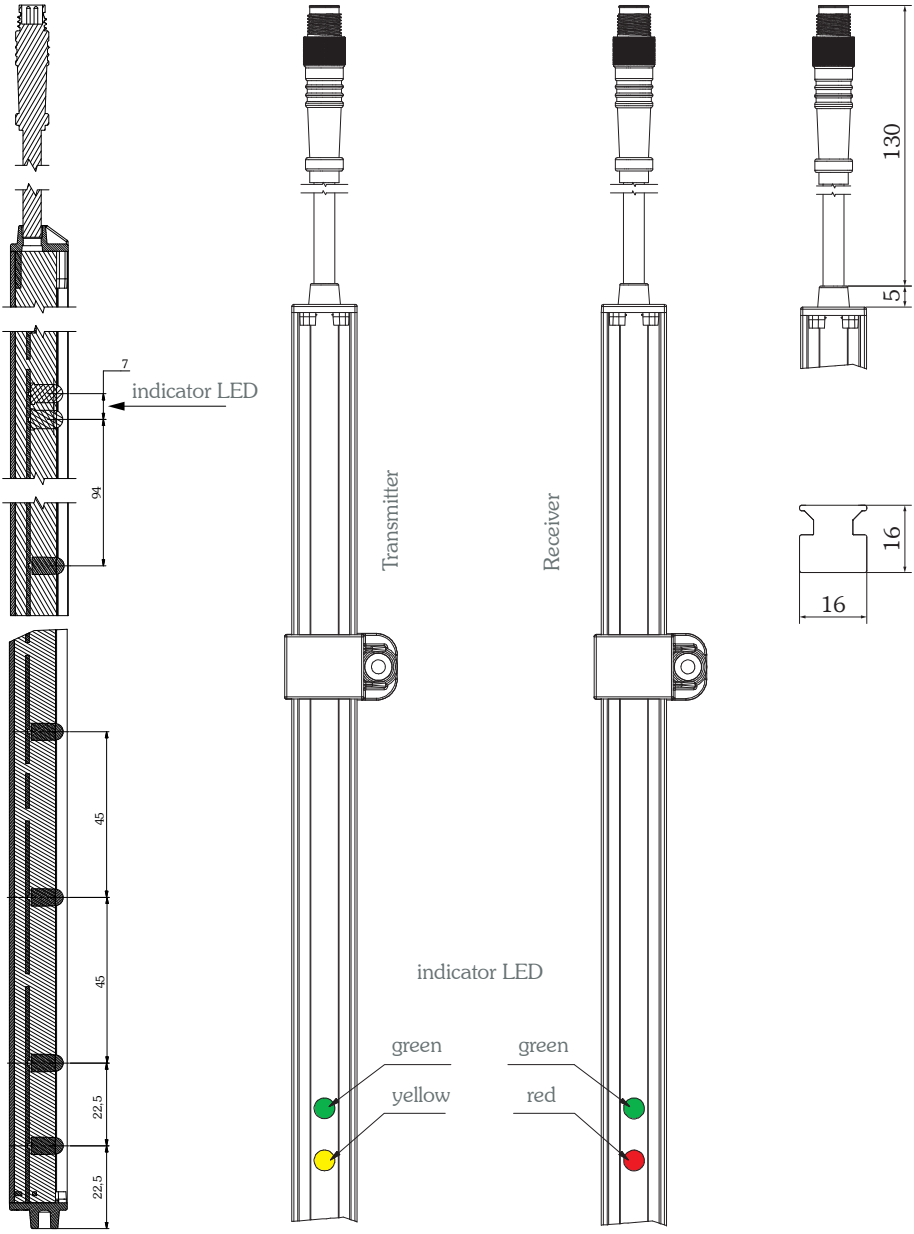
Version A



Version B

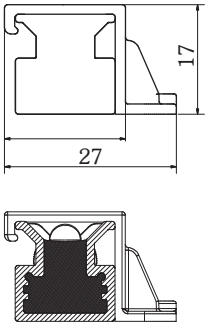


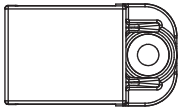
Version C

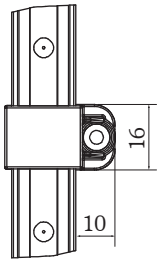

7
indicator LED
94
45
45
22,5
22,5
Transmitter
Receiver
indicator LED
green
yellow
green
red
130
5
16
16

Mounting materials

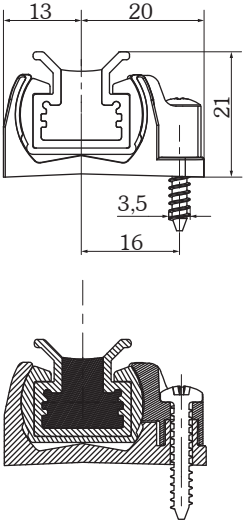
LIGI-HK 10 fixing clamp

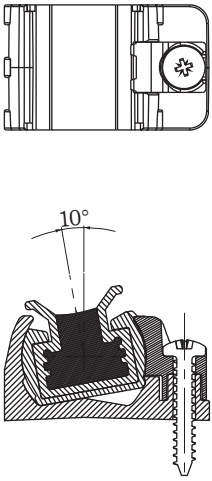


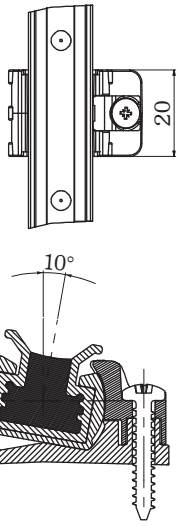




LIGI-JK 10 alignment clamp







EG-Baumusterprüfbescheinigung
EC type-examination certificate

Hiermit wird bescheinigt, dass das unten beschriebene Produkt der Firma
This certifies that the product described below from company

WITT Sensoric GmbH
Gradestraße 48-50
12347 Berlin
Deutschland

die Anforderungen des Anhangs I der Maschinenrichtlinie 2006/42/EG als eine Grundlage für die EG-Konformitätserklärung erfüllt.
meets the requirements of Annex I of the Directive 2006/42/EC as a basis for the EC declaration of conformity.

Geprüft nach
Tested in accordance with

EN 12978:2003+A1:2009
EN ISO 13849-1:2008
IEC 61496-2:1997
EN 12445:2000 Chap.7
EN 12453:2000 Chap.5.5.1

Beschreibung des Produktes
(Details siehe Anlage 1)
Description of product
(Details see Annex 1)

Lichtgitter für Toranwendungen
Light curtain for door applications

Typenbezeichnung
Type Designation

LIGI

Registrier-Nr. / *Registered No.* 44 205 13169201
Prüfbericht Nr. / *Test Report No.* 3512 5434
Aktenzeichen / *File reference* 8000423309

Gültigkeit / *Validity*
von / *from* 2014-03-20
bis / *until* 2019-03-19

TÜV NORD CERT GmbH
Zertifizierungsstelle Maschinen
Certification Body Machinery
Benannte Stelle 0044 / *Notified Body 0044*

Essen, 2014-03-20

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de machinery@tuev-nord.de

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

EG-Konformitätserklärung

nach EMV-Richtlinie 2004/108/EG
und Maschinenrichtlinie 2006/42/EG

Für die folgend bezeichneten Geräte
Sicherheitslichtgitter LIGI zur Absicherung von Türen und Toren
hergestellt nach den Fertigungsvorschriften 2.10400-499
mit folgenden Typ-Bezeichnungen:

Name	Geh.	Ausg.	Test	Strahl Typ	Kanal anzahl	Schutzfeld-höhe	Torfunktion mit / ohne	Kabel	Sonder-ausf.
LIGI	01 02	OSE	T00	A B C	8..44	315..2555mm	F00 F01	C00	S000
		P01 P02 N01 N02	T01 T02 T03 T04						

wird hiermit bestätigt, dass sie den einschlägigen Bestimmungen der oben genannten EG-Richtlinien entsprechen. Zur Beurteilung der Geräte wurden folgende Normen herangezogen:

EN 61326-3-2	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 3-2: Störfestigkeitsanforderungen für sicherheitsbezogene Systeme und für Geräte, die für sicherheitsbezogene Funktionen vorgesehen sind (Funktionale Sicherheit) - Industrielle Anwendungen in spezifizierter elektromagnetischer Umgebung
EN 61000-6-3	Elektromagnetische Verträglichkeit (EMV) - Teil 6-3: Fachgrundnormen - Störaussendung für Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe
EN 12978	Schutzeinrichtungen für kraftbetätigte Türen und Tore – Anforderungen und Prüfverfahren
EN ISO 13849-1:2008 Kat. 2 und PL-d	Sicherheit von Maschinen – Sicherheitsbezogene Teile von Steuerungen Teil 1: Allgemeine Gestaltungsleitsätze
IEC 61496-2 Typ 2	Sicherheit von Maschinen – Berührungslos wirkende Schutzeinrichtungen Teil 2: Besondere Anforderungen an Einrichtungen, welche nach dem aktiven opto-elektronischen Prinzip arbeiten

EG-Baumusterprüfbescheinigung Nr. 44 205 13 169201
TÜV NORD CERT GmbH (NB 0044), 45141 Essen, Langemarckstraße 20

Bevollmächtigt für die Zusammenstellung der technischen Unterlagen ist
Witt Sensoric GmbH, 12347 Berlin, Gradestraße 48

Diese Erklärung wird verantwortlich für den Hersteller
Witt Sensoric GmbH, 12347 Berlin, Gradestraße 48

abgegeben durch Herrn Jörg Brech (Geschäftsführer).

Berlin, 10.03.2014

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Witt Sensoric GmbH V2.0